

Application No. 09/705,996
Filed: November 3, 2000
TC Art Unit: 2125
Confirmation No.: 6364

REMARKS

The instant Amendment is filed in response to the official action dated March 8, 2004. Reconsideration is respectfully requested.

The status of the claims is as follows:

Claims 1-25 are currently pending.

Claims 1, 8-15, 20-21, and 23-25 stand rejected.

Claims 2-7, 16-19, and 22 are objected to.

Claims 1-2, 14-16, 20, and 23-25 have been amended.

The Examiner has rejected claims 23-24 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Specifically, the official action indicates that there is insufficient antecedent basis for the limitation "the chip" recited in claims 23-24, which depend from base claim 15. The Applicants have amended claims 23-24 to replace the limitation "the chip" with --the convective acceleration sensor--. The Applicants believe that the areas of rejection have been identified and addressed in the foregoing amendments to claims 23-24. Accordingly, the Applicants respectfully submit that claims 23-24 satisfy the requirements of 35 U.S.C. 112 and, as such, are in a condition for allowance.

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The Examiner has rejected base claim 15 under 35 U.S.C. 103(a) as being unpatentable over the Applicants' admitted prior art in view of Miller Jr. (USP 4,595,884). Specifically, the official action indicates that the Applicants' admitted prior art teaches the method of claim 15 except for the steps of generating a common-mode output voltage corresponding to a differential voltage, generating a control output proportional to the common-mode output voltage, and regulating the common-mode output voltage using the control voltage. The official action further indicates that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Miller Jr. relating to the regulation of common-mode output voltages with the teachings of the Applicants' admitted prior art. The Applicants respectfully submit, however, that the official action fails to establish a *prima facie* case of obviousness, and therefore the rejection of base claim 15 under section 103 of the Patent Laws is improper.

It is well settled that the discovery of the source of a problem may result in a patentable invention despite the fact that the solution would have been obvious once the source of the problem was discovered. Accordingly, the Applicants' basis for traversing the assertion of *prima facie* obviousness in the

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official action is that the discovery of the problem solved by the Applicants' claimed invention is not taught in either the Applicants' admitted prior art or the cited Miller reference.

For example, the problem addressed by the Applicants' convective acceleration sensor relates to providing a silicon micro-machined convective accelerometer that is less sensitive to temperature and power fluctuations (see page 2, lines 16-20, of the application). The Applicants solved this problem by recognizing that (1) the average common-mode output voltage of the thermopile is proportional to the power dissipated in the heater resistor, and that (2) the sensitivity of the acceleration sensor to temperature and power fluctuations generally varies according to the square of the heater power at low power levels, and is generally proportional to the heater power at higher power levels. The Applicants further recognized that the sensitivity of a convective accelerometer to temperature and power variations can be held at a desired value over power supply voltage variations and/or heater resistor make tolerances by controlling the common-mode voltage drop across the thermocouples of the thermopile (see page 9, lines 3-17, of the application).

In contrast, the Miller reference addresses the problem of reducing the current drain and cost of transducer amplifiers,

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while maintaining high common-mode rejection (see column 1, lines 5-10, of Miller Jr.).

The Applicants respectfully point out that the Miller reference is completely unconcerned with problems associated with operating convective acceleration sensors, particularly, the problem of reducing convective accelerometer sensitivity to temperature and power fluctuations. Instead, Miller Jr. merely seeks to provide a low current drain transducer output amplifier circuit that exhibits high common-mode rejection (see column 2, lines 28-35, of Miller Jr.). This is significantly different from what is disclosed and claimed in the instant application. The Applicants do not merely provide a device with high common-mode rejection like Miller Jr., but rather provide a convective acceleration sensor that is capable of controlling the common-mode voltage across the temperature sensing elements to hold the sensitivity of the sensor to temperature and power variations to a predetermined level, as recited in amended claims 1 and 15.

Clearly, because Miller Jr. does not address the problems associated with convective acceleration sensors, Miller Jr. would not recognize that convective accelerometer sensitivity to temperature and power fluctuations may be set to a desired level by controlling the common-mode voltage across the temperature

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sensing elements. Because the Applicants' admitted prior art and the cited Miller reference do not teach the problem addressed by the Applicants' claimed invention, much less the discovery of the source of the problem (*i.e.*, lack of control over the common-mode voltage drop across the thermocouples of the thermopile), a *prima facie* case of obviousness has not been established. Accordingly, the Applicants respectfully submit that the rejection of base claim 15 is improper and should be withdrawn.

Even if a *prima facie* case of obviousness had been established in the official action, the suggested combination of the Applicants' admitted prior art and the Miller reference still would not render amended base claim 15 obvious. This is because the official action fails to consider all of the limitations of the claim, particularly, the step of regulating the common-mode voltage across the temperature sensing elements using the control output. Because the official action fails to consider this limitation, the official action fails to consider claim 15 "as a whole", as required in an analysis under section 103 of the Patent Laws. Further, because neither the Applicants' admitted prior art nor the Miller reference provides any hint that the sensitivity of a convective acceleration sensor to temperature and power variations can be held to a predetermined level by regulating the

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common-mode voltage across the temperature sensing elements of the sensor, as recited in amended claim 15, the suggested combination of the Applicants' admitted prior art and the Miller reference does not render base claim 15 obvious. For at least these reasons, the Applicants respectfully submit that the rejections of base claim 15 and the claims dependent therefrom under 35 U.S.C. 103 are improper and should be withdrawn.

The Examiner has rejected claims 1, 8-11, 13, and 15 under 35 U.S.C. 103(a) as being unpatentable over Hosoi et al. (USP 5,945,601) in view of Lemkin et al. (*A Three-Axis Micromachined Accelerometer with a CMOS Position-Sense Interface and Digital Offset-Trim Electronics*). Specifically, the official action indicates that the Hosoi reference teaches an integrated convective accelerometer chip and control thereof; however, Hosoi et al. fail to teach amplification circuitry for generating a corresponding common-mode output voltage, and control circuitry for receiving the common-mode output voltage and for generating a control output proportional thereto, in which the control circuitry is operative to regulate the common-mode output voltage using the control output. The official action further indicates that Lemkin et al. teach an integrated accelerometer chip with mechanical sensors, including amplification circuitry for

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receiving a differential output voltage generated by the sensing elements and for generating a corresponding common-mode output voltage, and control circuitry for receiving the common-mode output voltage, for generating a control output proportional thereto, and for regulating the common-mode output voltage using the control output. The official action then concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the integrated accelerometer chip with common-mode control, as disclosed by Lemkin et al., with the integrated convective accelerometer chip of Hosoi et al. to obtain the subject matter of claims 1, 8-11, 13, and 15.

The Applicants respectfully submit, however, that the official action again fails to establish a *prima facie* case of obviousness, and therefore the rejections of the claims 1, 8-11, 13, and 15 under section 103 of the Patent Laws are improper. As described above, the Applicants' convective acceleration sensor solves the problem of reducing the sensitivity of the sensor to temperature and power fluctuations. Although the Hosoi reference discloses an acceleration sensor having temperature sensing elements, Hosoi's device solves a different set of problems, namely, improving the response of the sensor, increasing the accuracy of the sensor, and making the sensor more adaptable to

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mass production (see column 2, lines 32-42, of Hosoi et al.). Moreover, Lemkin et al. are completely unconcerned with the problems associated with operating convective acceleration sensors. In fact, instead of relating to convective acceleration sensors, the Lemkin reference relates to capacitive displacement accelerometers, which are subject to significantly different problems such as sensitivity to parasitic capacitance at their input (see page 456, Introduction, 1st paragraph, of Lemkin et al.).

Because the Applicants' convective acceleration sensor and the accelerometers of Hosoi et al. and Lemkin et al. address significantly different problems, one of ordinary skill in the art at the time the invention was made would not have been motivated to combine the Hosoi and Lemkin references, as suggested in the official action. Accordingly, the Applicants respectfully submit that the official action fails to establish a *prima facie* case of obviousness, and therefore the rejections of the claims 1, 8-11, 13, and 15 under 35 U.S.C. 103 are improper and should be withdrawn.

Even if a *prima facie* case of obviousness were established, the suggested combination of the Hosoi and Lemkin references would not render amended base claims 1 and 15 and the claims dependent

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therefrom obvious because neither the Hosoi reference nor the Lemkin reference teaches or suggests reducing sensitivity to temperature and power variations by regulating the common-mode voltage across the temperature sensing elements of the convective acceleration sensor, as recited in amended claims 1 and 15. For at least these reasons, the Applicants respectfully submit that the rejections of base claims 1 and 15 and the claims dependent therefrom under 35 U.S.C. 103 are improper and should be withdrawn.

The Examiner has rejected claims 1, 13, and 15 under 35 U.S.C. 103(a) as being unpatentable over Leung (USP 6,182,509) in view of Lemkin et al. Specifically, the official action indicates that the Leung reference teaches an integrated convective accelerometer chip and control thereof, however, Leung fails to teach amplification circuitry for generating a common-mode output voltage, and control circuitry for receiving the common-mode output voltage, for generating a control output proportional thereto, and for regulating the common-mode output voltage using the control output. The official action concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the Leung and Lemkin references to obtain the subject matter of claims 1, 13, and 15.

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However, as explained above, the Lemkin reference neither teaches nor suggests reducing sensitivity to temperature and power variations by regulating the common-mode voltage across temperature sensing elements of a convective acceleration sensor, as recited in amended base claims 1 and 15. In fact, the Lemkin reference discloses capacitive displacement accelerometers - Lemkin et al. are completely unconcerned with the problems of convective acceleration sensors. Accordingly, even if the Leung and Lemkin references were combined as suggested in the official action, the resulting combination would not render the subject matter of amended base claims 1 and 15 and the claims dependent therefrom obvious. For at least these reasons, the Applicants respectfully submit that the rejections of claims 1, 13, and 15 under 35 U.S.C. 103 are improper and should be withdrawn.

In addition, the Examiner has rejected (1) claim 21 under 35 U.S.C. 103(a) as being unpatentable over Leung in view of Lemkin et al. as applied to claims 1 and 15 above, and further in view of Straw (USP 5,339,285); (2) claims 8, 10, 12, and 23-24 under 35 U.S.C. 103(a) as being unpatentable over Leung in view of Lemkin et al. as applied to claims 1 and 15 above, and further in view of Pfennings (USP 5,229,709); (3) claims 12 and 23-24 under 35 U.S.C. 103(a) as being unpatentable over Hosoi et al. in view of Lemkin

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et al. as applied to claims 1, 8, and 15 above, and further in view of Pfennings; (4) claim 20 under 35 U.S.C. 103(a) as being unpatentable over Leung in view of Lemkin et al. as applied to claims 1 and 15 above, and further in view of Ishida (USP 6,683,358); (5) claim 20 under 35 U.S.C. 103(a) as being unpatentable over Hosoi et al. in view of Lemkin et al. as applied to claims 1, 8, and 15 above, and further in view of Ishida; (6) claims 14 and 25 under 35 U.S.C. 103(a) as being unpatentable over Leung in view of Lemkin et al. as applied to claims 1 and 15 above, and further in view of the Applicants' admitted prior art or Chen (USP 5,861,775); and, (7) claim 20 under 35 U.S.C. 103(a) as being unpatentable over Hosoi et al. in view of Lemkin et al. as applied to claims 1 and 15 above, and further in view of the Applicants' admitted prior art or Chen.

The Applicants respectfully submit, however, that the cited Straw, Pfennings, Ishida, and Chen references fail to cure the deficiencies of the Miller, Hosoi, Lemkin, and Leung references, as outlined above. Accordingly, even if the various references were combined as suggested above, the resulting combinations would not render claims 8, 10, 12, 14, 20-21, and 23-25 obvious.

It is noted that each of the claims 8, 10, 12, 14, 20-21, and 23-25 is dependent from either amended base claim 1 or amended

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base claim 15. The Applicants respectfully submit that these rejections of dependent claims 8, 10, 12, 14, 20-21, and 23-25 under section 103 of the Patent Laws are improper and should be withdrawn.

The Applicants have amended claims 2-7, 16-19, and 22 in independent form including all of the limitations of the base claim and any intervening claims, and to more definitively recite the subject matter of the claims. The Applicants therefore respectfully submit that amended claims 2-7, 16-19, and 22 are allowable.

In view of the foregoing, it is respectfully submitted that the present application is in a condition for allowance. Early and favorable action is respectfully requested.

The Examiner is encouraged to telephone the undersigned Attorney to discuss any matter that would expedite allowance of

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the present application.

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